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SciVerse ScienceDirect

Procedia - Social and Behavioral Sciences 61 (2012) 244 – 245

Procedia
Social and Behavioral Sciences

Academy of Aphasia 2012

Shared and Distinct Language Performance in Two Children with Non-overlapping Early Focal Brain Lesions

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Case studies of typical adults with brain injuries have demonstrated consistent lesion-site to cognitive deficit associations, suggesting a modular organization of language, such that specific regions are required for specific cognitive functions. Findings from children with focal lesions, however, are more variable. Some investigations corroborate a modular organization similar to the adult model such that children with left hemisphere damage show more deficits on language tasks, and children with right hemisphere damage show more visuo-spatial deficits. Other findings from children with early focal lesions emphasize the role of development in forming the adult cognitive structure, and do not predict a specific lesion-site to cognitive deficit mapping. Such results support a neuroconstructivist account and suggest that the modular structure observed in adults is not set early in development, and thus deviant patterns of brain development may lead to largely typical language functioning. The contrasting results described may be partially due to differences in measurement. Results consistent with a neuroconstructivist framework are found more often with less restrictive *language use* measures, and findings substantiating a modular account tend to be identified using standardized language measures that probe isolated language components. We present a case study that includes both standardized and naturalistic *language use* measures, in tandem with quantitative morphological and diffusion measures acquired with magnetic resonance imaging (MRI). Two school-aged females (aged 9;3 and 11;2) with non-overlapping perinatal focal lesions (encephalomalacia in left parietal lobe, affecting perisylvian regions, and right frontal porencephalic cyst, respectively) are compared to typically developing children (N = 20) aged 7-12. Since the two cases show non-overlapping, non-homotopic lesions, any similarities in cognitive deficits would provide evidence for a neuroconstructivist view. On the other hand, disparate cognitive deficits between the two cases, and cognitive deficits that mirror the adult model (i.e. more severe language deficits in the child with LHD), would substantiate a modular view of cognitive organization.

Results from standardized and *language use* measures combined support a hybrid between these two theories. When compared to their typically developing peers, the two children showed similarly degraded processing (more than two standard deviations below the mean) on the majority of standardized language measures, providing evidence against a modular view. When compared to one another, however, results also revealed some distinctive differences in cognitive and linguistic performance, providing some evidence that there exists an optimal, proto-language system. Specifically, the child with LHD (though not the child with RHD) demonstrated performance within the normal limits on subtests that did *not* require semantic processing, and the child with RHD (though not LHD) showed performance within the normal range for measures requiring semantic and phonological processing, though not syntactic processing. Our results from *language use* measures indicated that both children fell within two

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standard deviations of the mean on all measures of narrative quality, (including length, use of complex syntax, and morphological errors), but *both children* made significantly more morphological errors in their written narratives than their typically developing peers. Results are discussed within a framework of a dynamic pluripotentiality model.